Abstract of the Disclosure

The density of at least one fluid in a pipe is determined using a pair of effective sound speeds a_{1eff} and a_{2eff} of the fluid/pipe system. The pair of effective sound speed measurements is taken at two sensing regions along the pipe wherein each of the sensing regions has a different cross sectional area compliance. The pair of effective sound speeds a_{1eff} and a_{2eff} is provided to signal processing logic 60, which determines the density of the fluid flowing in the pipe. The effective sound speeds a_{1eff} and a_{2eff} may be provided by a pair of sound speed meters positioned at the sensing regions wherein the sound speed meters utilize a spatial array of acoustic pressure sensors placed at predetermined axial locations along the pipe. The acoustic pressure sensors measure one-dimensional planar acoustic waves that are lower in frequency (and longer wavelength) signals than those used for ultrasonic flow meters, and thus is more tolerant to inhomogeneities in the flow. In addition, no external acoustic source is required and the meters may operate using passive listening.